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ROYAL BOTANIC GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 10] [1918

XXXIV.—CHARLES OGILVIE FARQUHARSON AND HIS WORK IN WEST AFRICA.

It is with the deepest regret that his friends at Kew have learned that the name of Mr. C. O. Farquharson, Mycologist, Southern Nigeria, whose appointment was recorded in *Kew Bulletin*, 1911, p. 377, occurs in the list of passengers missing as the result of the loss at sea, through collision, of the homeward bound ss. "Burutu" on the night of 3rd October.

The keen enthusiasm brought to bear by Mr. Farquharson on his work, the sound judgment with which he confronted its problems, and the excellence of the results he had already achieved, afforded those interested in the future of West African Agriculture reason to expect for him a useful and distinguished career. We regret the tragic frustration of these hopes and lament the loss of a highly gifted and singularly attractive personality.

The following letter to the Assistant Director, dated 23rd September, and received at Kew on 15th October, was sent by the mail following the ill-fated vessel on which Mr. Farquharson sailed. The letter shows that he had a strong foreboding that his voyage home might end in disaster, and this is also indicated by its despatch by a later mail.

The letter is unlike any of the other letters sent by Mr. Farquharson from time to time to Kew, and is a remarkably graphic epitome of his life work in Nigeria. The nature of the work, the methods by which he sought to solve the many difficult problems, and the kind of education that his experience had led him to believe best for such work are all fully discussed. The views expressed apply to tropical plant pathology generally and are so worthy of consideration that the letter is published almost in its entirety. It is conceivable that but for his presentiment Mr. Farquharson would not in a single letter have embodied so fully his results and views.

(106.) Wt. 196—794. 1,125. 12/18. J. T. & S., Ltd. G. 14. Sch. 12.

Agricultural Department,
Ibadan, Nigeria.
23.8.18.

Dear Mr. Hill,

Kew hears so seldom from me that I suppose it has by this time "written me off" a bad example of ingratitude and possibly as a failure. I am writing now because I am ordered home by the next boat, which sails about the beginning of next month. This will be posted by the following boat and will tell you what I have been doing, in case the Boche prevents me telling you what news I have in person. I hope to get home all right and see Kew, but one never knows. At the end of this month I shall have completed 23 months' residence, and it will be bad luck to get done in on the way home. However, I want to get home for some things, and one must take the risk.

I may say that you haven't heard of me mycologically because, except for rare and brief intervals, I have not been mycologist this whole tour. I have been a Curator, the Curator in charge of the field labour here and at Agege. My scanty daylight leisure I have not devoted to mycology, because Ibadan, or our part of it, is mycologically arid. I do not suppose you wish to be deluged with fungi imperfecti, Phomas, Cladosporiums, and such like. There are no others. So effectively cleared is our place that I rarely see a Mycetozoon. I did them up before the clearance was complete. Under the inspiration of my former colleague, Dr. Lamborn, and encouraged by Professor Poulton, I have done little bits of entomology in my leisure, and perhaps know as much about the ways of getting at insect life histories and noting their relations to their environment as any other mycologist in the field and maybe a little more. With some knowledge of handling labour gained in 20 odd months gang driving of some two hundred men, my education, I think, I can consider fairly wide, and in West African conditions, fairly useful.

Forgive this preliminary blast on my own particular trumpet—it is not intended to be a world-resounding affair, but you may not be inclined to agree with some of my views later on, and I am merely putting in a varied experience to disarm criticism as far as possible. I ought to add that George Massee's economic-mycological outlook has influenced most things I have done, perhaps not as published, but in the intimate expression of his views that he used to give at Kew. Again and again I have wished he were alive. Kew wasn't the same place to me last time I was home.

My experience here, especially being in a position in which I was more or less responsible for getting up crops or giving a plausible reason for failure, has convinced me that every mycologist ought to be deprived of his microscope (and perhaps even of his pocket lens) for at least the first tour of his service, and perhaps for two years, and compelled to raise *normal* crops with no artificial aids of any sort. If possible, also, he should be compelled to study a really representative half-dozen drainage problems and see them solved by experts. He would greatly benefit by having to dig a few drains himself. I do not pretend

to be an expert, but for the first two months of this tour I did dig drains, bits of them myself, and supervised the digging of an open system, three feet (and even over) deep. I had to do this because I diagnosed asphyxiation to account for defoliation and die-back on some of our cocoa here. Several nights I was so dead tired by 7.30 that I had to turn in without dinner. I had a very bad leave last time, and came back here feeling anything but well. But I saw the water pouring out of a clay subsoil, as each spadeful of soil came out, and in due course I saw the cocoa trees shoot out leaf buds everywhere, and that was something. When I read descriptions of "wither-tip" of some crop with elaborate cultural data of some obscure *Phomopsis* or other idiotic fungus, I blush for the quack who wrote it. I know there are other causes of die-back in cocoa and other trees than lack of drainage. I have had such problems, but I am convinced that all of them can and must be solved without the aid of 1-12th in. objectives and Bordeaux mixture.

While I am on the subject of mycological quacks, let me tell you that to my mind the most outrageous are the entomogenous fungus "boosters." Massee shattered my faith in them. I had the luck to be in the Jodrell Laboratory when such a fungus came from the States, called *Aegirita Webberi*, named, I think, by Fawcett (California). "Aegirita" Webberi was the haustoria (moniliform clusters of cells) of a Perisporiaceous fungus (a sooty mould) which had grown on the secretions of the coccid it was said to kill. I regard the E.F.B.'s aforesaid as quacks, because so far I have met with none who attempted to find out when a coccid or any other insect dies a natural death, or conversely, proves insects to be immortal, apart from those carnivorous fungi. Mycologists are not the only people led astray by insects. I know a medical officer out here whose bonnet harbours an insect, not a bee, but the species of *Chrysops* which is the intermediate host of a *Filaria* (loa, I think). It doesn't occur here, but does in Sapele in particular. The medical officer came here a year or two ago, early in the rains (the spring). Seeing our nice fields of young maize, he asked, almost with a shudder, whether we got much trouble from red fly (*Chrysops*). I said it didn't occur at all, and he refused to believe me. I asked him why it ought to be here, and he told me he was certain its prevalence had a connection with young maize! He was so convinced that it was no use arguing that when the maize is young the dry season is over, the yams are young, the groundnuts are young, and that, in fact, it was the spring. And the fact is, of course, there *are* no *Chrysops* here. Our mycological bug-slayers overlook the normal seasonal periodicity of insects, and it seems to me that not a few have sprayed their fungus-spores just when the insect was about to go anyhow. The seasonal periodicity of insects is extremely well marked here. One day, going from my office to my quarters, I probably see dozens of "Painted Ladies" (*Pyrameis cardui*). Next day and for a few months they are not. Early in the rains for two or three days thousands of migrating Libytheine butterflies pass here flying southwards. The negro peasant knows that after that he may safely sow his cereal crops—

maize, at any rate. Towards the end of the rains swarms of the same butterflies return northwards. One may conclude that the rains are over. Between the flights to and from the forest belt we never see them. Unquestionably some of our insect pests are only pests when the agriculturist has failed. The agriculturist may not like to be told that. He doesn't object to be told to spray. There is a fine "act of God" feeling about it, so fine indeed that he doesn't even spray, but is satisfied with the belief that it *might* be done with success. The notorious West African cocoa "bark-sapper" (*Salbergella* sp.) in my experience is a pest on the careless agriculturist, a deserved visitation. A leading native grower here sent to the Department by one of our native instructors a collection of insect pests that were vexing him. They were bark-sappers. In the absence of our entomologist these things come my way (though I get no official credit). I sent the instructor to the plantation with a list of questions to answer as to the contour of the farm, soil and subsoil, whether the pest was worst at the top of any slopes on the farm or at the bottom, and if at the bottom whether the land was swampy. He came back, bringing trees (with roots) that he'd dug up. Before he said a word I knew from the stunted, gnarled tap-roots that the trees had grown on the most refractory laterite pan. He told me there was but 4 in. of soil above the laterite, and that the trees were on the top of a slope. At the bottom, near water, on rich soil there wasn't a sapper to be seen. I sent word to the owner that if he really wanted to grow cocoa on such a place he'd have to dig big holes and deep, and fill them up with compost. He would know himself, from his normal profit margin whether the expense would justify that method or whether it would be better to recognise that laterite was no soil for cocoa. When next I heard of him he had read my report in a meeting of the Agricultural Society of Ibadan and denounced my remedy (and me) as impracticable.

I noticed some time ago that ——, after listing various non-cocoa host plants of the bark-sapper which ought not to be planted near cocoa plantations (including *Acalypha* hedges in his proscribed list), goes on to mention that though *Salbergella* is a parasite of *Acalypha*, which is a hedge at Aburi, yet the cocoa there appears never to suffer from the bug's attentions. I am strongly inclined to think the reason is that the Aburi cocoa is *cultivated* and is in a position to keep the sapper at a distance. Thrips of cocoa is unquestionably a sequela of misguided agriculture. I hope you will not think I am unduly critical when I say that the average ——'s mental outlook is seriously distorted by a smattering of things entomological and mycological. They appear to me to think that because they know a bark-sapper or a root fungus and put down their names correctly that nothing more is to be said than that the trouble has been overcome by Bordeaux mixture or will probably respond to its application.

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If I had to map a course for a plant pathologist, I'd make a year's residence on a farm compulsory and make physiology, systematic and applied (the latter being essentially intensive

agriculture and including soil physics and meteorology) the chief subject. I would bar microscopes till the last year of the training. Every spare hour should be in the field. Particularly futile I thought was a course of mycological lectures I once attended, futile because the average student there didn't know what it was to go into the field. Undoubtedly the Aberdeen student under Professor Trail stood a better chance of being able to interpret things as they appear in the field. Field physiology, as opposed to laboratory physiology studied by means of beakers, tubes, and all sorts of ingenious appliances, is a study that wants developing. Let me illustrate my meaning from my own experience. The optimum planting date for American cotton here is about the 17th of July. Every day planting is delayed after that, in a *normal* rainfall year, increases the risk of a short crop. The great limiting factor after that is the Harmattan which comes on about November or December after the rains have stopped but before any marked response to that—in the way of leaf fall has set in. Once the Harmattan sets in (it is more or less intense from the start) defoliation is rapid. That is followed by a meagre flush of new foliage, the leaves of which are greatly reduced in size. Flowers may still and do continue to appear, but the bolls are undersized, are often badly worm-infested, and when mature their cotton is rarely worth picking. Now you might think that it would pay to plant a week or two or even a month earlier. Well, I tested the point by serial plantings, and found that June plantings or even more abnormally early are hopeless; the plants become the prey of the anthracnose fungus, Fusariums, physiological "red rusts," and dear knows what else. By the end of July they are the most stunted, miserable, flowerless, boll-less things you could imagine, blighted beyond recovery. I do not believe that spraying would be of the least good for the fungi (it would never pay on the bread-and-cheese cut-priced cottons we have to grow here), and even if the fungi were elminated there would still be the other physiological troubles. The groundnut here is another good instance. Groundnuts may be planted here up to the end of April (the rains begin with the tornadoes about the end of March or even earlier), or if the rains are late, into May. They will grow magnificent plants of a diameter of six or eight feet if not crowded, and will mature about mid-July or August. Let us say that up to the time when the vine has stopped growing and is on the turn it gets x in. of rain. We used to plant (up to 1914) about June and even later. Planting then, it is quite possible that the crop before the rains stop will get x in. of rain, at times more, at times less. But the bulk of the plants will be stunted, chlorotic, or mottled green and yellow, and instead of spreading normally (I am not referring to normal erect-growing types) grow *erect*, the leaves are very much reduced in size, and hardly any nuts are formed. When I came here in 1912 I never questioned the time of planting. I took it for granted as correct. I found myself up against this bunching and mottling, could find neither insects nor fungi, and the tubercles on the roots were apparently normal. The natives do not grow them much here, and, truth to tell, I didn't think of asking them about the crop. I couldn't get to Northern

Nigeria, where I knew the nuts *must* grow well, and had to make the best of it. I tried all sorts of ideas, but mainly kept my eyes open for a field clue. I got this indirectly when trying to solve a rather similar cotton (native type) problem. Up to 1914 our highest yield of groundnuts as harvested amounted to just over 500 lbs. per acre, which would probably have weighed about 300 to 400 lbs. when dry (unshelled nuts). We had many worse than that, that wouldn't bear recording, down to 11 lbs. per acre! Now normally we get from 1,000 to 1,300 lbs. of well dried nuts per acre (equivalent to about a ton as harvested). With the aid of lime I secured 1,700 lbs. once, but the liming had nothing to do with disease. In a ten-acre field one cannot see a "bunched" plant. The cotton disease that gave me the clue was solved in a different way. Up here "native" cottons are affected by a serious and incurable disease, of "physiological" origin. The plants get contorted. The leaves get covered with intumescences on the underside, and freak in the most extraordinary way. Flowering is greatly reduced, and, of course, bolling. The Upland Cottons (Americans of our introduction) were never affected. I found the solution of that from sheer field observation. Native plants near the coast, where the humidity average is much higher, grow normally. The key to the problem lay in the fact that the Americans were *upland* cottons. Their hirsuteness is an upland character. The natives (*G. vitifolium* and *peruvianum* strains) are glabrous. It took two whole tours before these obvious facts sank into my brain, but I doubt if anybody else would have done any better. The remedy for the disease was to grow the right cotton in the right place. Unfortunately for the cotton spinners, cocoa has long since ousted cotton from the high humidity belt. It was only from noticing a few stray survivors of bygone cultivation at Bonny that I tumbled to the cause of the trouble.

Before leaving the groundnut, I may say that my theory to account for the facts is that it is not the leguminous portion of the groundnut that suffers in the mid-rainy season planting, but the nodule organism that is "diseased" (perhaps from too low a soil temperature during the period immediately after it infects its host, or perhaps even before that it has become "involuted") or because the soil then being at its maximum wetness, the organism in the soil has become involuted. When it does infect the groundnut it either reverts to its ancestral parasitism, or, being itself at least below par, while not becoming a parasite, is yet unable to fulfil all the terms of the partnership. I may, as I have said, meet a Boche torpedo on the way home. If so, I hope you'll get someone to test my hypothesis. Further, I feel sure that something might emerge from a study of clover sickness along these lines at home. Could you induce someone to carry out serial plantings of clover varieties, both in England and Scotland? In the north of Scotland at least the disease doesn't occur. There may be some factor inhibiting out-of-season germination, either planting custom or meteorological.

Now you will see what I mean by field physiology. I doubt if any of the problems I have mentioned could have been solved in a laboratory, or at any rate only with the utmost difficulty

and good fortune. I do not suggest that the problems are solved in the ultimate sense, but at any rate I know the practical remedies, and that is a great deal.

As you know, I did find a real fungus disease last year, *Bagnisiopsis Dioscoreae* [see *K.B.* 1918, p. 199], not a very serious pest but quite noticeable and very striking indeed. And as you know, perhaps, we have been having a great time with coconut bud-rot. In regard to that disease, it seems to me that too much has been made of *Bacillus coli*, and the elementary fact has been lost sight of that dicotyledenous plants die back following asphyxiation of their roots for want of drainiage or other adverse soil factors. The first symptom is the death of the growing point of the main axis, if there is one, or of that and the side branches. Now, a palm has only got *one* to go on with, outside its fronds, and when that goes there is no hope of recovery. That growing point can "go" exactly as one or many of the growing points of a dicotyledonous tree may, and for the same reasons. The essential remedy is proper cultivation, growing the palms in the proper place on a proper soil in the proper way, with plenty of light and air. People have been so obsessed with the maritime habitat legend that they fail to see that the palm does well there because there are few competitors and it can get abundance of light to seaward and plenty of breeze.

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I hold strong views on cocoa disease out here, and to my thinking the key to the whole problem was indicated in that book by the late Secretary for Native Affairs, when he reminded us that "the native has no State-consciousness." The pest of cocoa *is* the native. He doesn't "cultivate" cocoa. He exploits a "weed" that yields a product closely allied to cocoa. I pointed this out to Government here. The great blight of cocoa is the fact that the native can exploit it at 10s. and less per cwt. cost of production of dried cocoa, and for years has sold it for 40s. and 50s. and even more. The best thing that could happen to Gold Coast and Nigeria native planters would be for them to be brought to the verge of ruin so that they might have to eat bread by the sweat of their brows and not ride in flash motor-cars by the exploitation of a product of the intelligent and painstaking selection of other races which happen to grow well, up to a point, in their country. I told the Government here that cocoa grew like a weed, that in fact it *had* to grow like a weed in order to survive. I illustrated this by reminding them how difficult it is to keep a prize vegetable (raised by long and intelligent selection) up to the prize standard. If it is put on poor land, is untended and generally neglected, it will have to revert to "weed-dom" if it is to survive at all, and if it does it will be no sweet and tender vegetable, but a hard-bitten, fibrous, just edible weed. The only remedy for West African cocoa is to let in European enterprise to "freeze out" the native if he fail to mend his ways. Cameroons cocoa is the same variety (largely) as Gold Coast and Nigerian. The soils are about the same. The difference in price of their product arises from this fact solely that Cameroons cocoa was prepared by natives as *servants* under the supervision of white

men who *had* a State-consciousness and valued their reputations. No amount of preaching will make the native improve. Adversity may force his hand, but he may simply revert to yams and cassava and trading wild stuff. I think he will, in fact, People talk at length about the phenomenal progress of cocoa on the Gold Coast. I took it on myself (when acting D. of A.) to tell the Government that it would have been better for the cocoa had the rate of increased production (which isn't progress if the product is the worst that comes into the world's market) been very much slower. I personally believe that the Western Ethiopian is as likely to change his skin as mend his ways. The facts of anthropology and ethnology are against him.

Last month a very interesting "disease" of Para rubber came my way, from a plantation at Sapele. They sent two large cases containing pieces of rubber tree stems and roots. No details were sent at all. They simply asked what was wrong with them. I could see nothing on the stems except *Diplodia cacaoicola*, which is no parasite of rubber, any more than of cocoa. However, I noticed two small rootlets with knobs on them about the size of a small hen's egg. I could see they weren't eelworm galls, but was inclined to think the roots were there by accident. One "gall" was not quite so decayed as the other, and in folds or depressions of it I noticed groups of hairs very similar to those of mite galls. Yet I couldn't believe that such things could be made by mites, and a section of the "gall" was not helpful. So I wired for more specimens of the galls, and got them—things like big lumpy potatoes, and some bigger, on *rubber roots* all right. This time came a letter, in which the manager said he also sent a small packet of a bush plant that seemed always to be growing near attacked trees, and wished to know if it had anything to do with the trouble. I opened up this package and was for the moment stumped. I thought they had nothing to do with the case. Kirby was looking at them, and probably thought the same. You will perhaps think I ought to have spotted them at once, but I am ashamed to confess that though I had often seen the bush plant I had never collected or studied it; but a dim recollection of Professor Trail's classroom came to me in a flash, and I *knew* it was one of the *Balanophoraceae*. I think it is *Thonningia sanguinea*. The Yorubas call it Ade-ile—the Crown of the Land, an unusually poetic and pretty fancy for these people. I remembered seeing it frequently in the bush at Agege, so, having to go down there to pay the labour, I looked them up and tried to follow out the roots of one to the bitter end. I take it that the tuberous parts are haustoria. The ordinary roots, which are densely clad with hairs (similar to those of the "galls"), are long things, extremely long for the size of the plants. Some I followed out for six feet or more and failed to find the ends of them. I had very little time, not enough in fact, to trace them to where they joined the host, and had to leave instructions for a native overseer to look for the "tubers." Some labourers apparently had seen the Ade-ile in our rubber plantation there, and so got on to them. Now, in connection with most fungus attacks I have personally seen hundreds of trees dug up from 1912 onwards and never yet met any "tubers" on the roots.

What was my surprise when the overseer sent me a perfectly astonishing tuberous mass on one of our rubber trees, quite twice the size of a big human head, and enfolding two quite large Para rubber roots. I am now not a little puzzled over this problem. Has Ade-ile always been there and been overlooked? (The tree on which it had fastened showed no ill effects, and it is not yet clear whether they do so at Sapele.) The plantation has a bad fungus history, and they also must have dug out lots of trees. I feel sure they would have made special records if they had found the *Balanophora*. Or has the parasite taken about ten years (from the time the plantation was laid out—ours dates from 1910) to overcome the resistance of the Para rubber tree?

With great regret I had to give a careful study of our stem (post tapping) disease of rubber at Agege the go-by. You may remember that I suggested that the longitudinal cracks on the tapped surfaces are external manifestations of internal "shakes" of the star variety. I saw enough last year, during brief visits to Agege to look after and pay labourers—not to mycologise, of course—to convince me that the trouble is physical and perhaps also physiological, and not the sequel to parasitism of any sort. However, I know that it is at its worst at the height of the rains. Four cuts (in the half herring-bone style) were made, and by the end of the season four tracts of outer cortex had been removed, each about 4 inches wide. It was evident at the end of the season that the location of the lesions had a definite periodicity which corresponded, as I have said, to the time when the rains were at their height. It seems to me that the longitudinal "fissures" in the unremoved layer of the cortex are the result of outward pressure of the growing central cylinder on the portion of the cortex weakened by excision of the outer layer in tapping. The weather conditions may either be such that callus-formation or bark-renewal is inhibited, or at any rate on the weakened place cannot keep pace with the excessive rate of growth that presumably occurs at the height of the rains. At any rate I think the phenomenon may be regarded as a "shake" of the cortex whatever the predisposing cause. Fungus attack may follow, but is by no means an invariable consequence, and there is frequently a normal renewal as the dry season ensues. The healed surface in such cases is irregular and "lumpy" and will be difficult ever to tap again, but the important point is that there may be no fungus-attack phase which appears to me strongly to support my hypothesis. If I get knocked out by the Boche you will at any rate be able to suggest to someone to attack the problem on these lines.

Now I must be closing. This letter will come by the mail following the one by which I sail. I hope to have the opportunity to tell you my theories in person and clear up what I have failed to express clearly. I am bringing some good *Balanophora* material, but apart from that I have nothing this leave. I must again thank Kew for all the help I've had and apologise for the meagre return.

Yours sincerely,

C. O. Farquharson.

XXXV.—CONTRIBUTIONS TO THE FLORA OF SIAM.

Additamentum X.

W. G. Craib.

Evodia glomerata, *Craib* [Rutaceae-Zanthoxyleae]; species quoad inflorescentiam *E. simplicifoliam*, Ridley, simulans sed ex descriptione ab hac foliis fere semper trifoliolatis, foliolis oblongo-obovatis vel oblongo-oblanceolatis acuminatis acutis vix coriaceis differt.

Frutex circa 1·5-metralis (ex *Kerr*); ramuli juventute dense molliter albo-pubescentes, subflavidi, cortice mox rubescente, ad nodos parum compressi. *Folia* opposita, trifoliolata, rarissime unifoliolata, petiolo communi 2-5 cm. longo saepissime valido supra late sed haud alte canaliculato indumento ei ramulorum simili obtecto suffulta; foliola saepissime obovato-oblanceolata vel oblongo-oblanceolata, apice saepius breviter acuminata, costa excurrente apiculata, basi cuneata vel interdum acuminata, lateralia basi inaequilateralia, usque ad 14 cm. longa et 5 cm. lata, terminali lateralibus parum maiore, rigide chartacea, copiose pellucido-punctata, sicco supra fuscescentia, subtus pallida, pagina superiore ad costam nervosque laterales densius breviter pubescentia, indumento saltem costae persistente, inferiore molliter pubescentia et glandulosa, indumento mox plus minusve deciduo, nervis lateralibus utrinque circa 10-13 supra gracilibus palescentibus subtus validioribus prominentibus bene intra marginem anastomosantibus nervulis supra saepe conspicuis subtus prominulis, margine cartilaginea, densius breviter ciliata, sessilia vel petiolulo brevi suffulta. *Inflorescentia* axillaris, densa, petiolo dimidio brevior, vix 2 cm. diametro, pedunculo communi 1-2 cm. longo indumento eodem ac ramulis obtecto suffulta; flores breviter pedicellati; bracteae parvae. *Sepala* 4, subovata, acuminata, acuta vel obtusa, circa 1·75 mm. longa et 1·25 mm. lata, crassa, dorso glandulosa, puberula, intra glabra, ciliolata. *Petala* 4, conspicue glandulosa, oblongo-ovata, summo apice incrassata, cucullata, paulo ultra 3 mm. longa, 1·75 mm. lata, ciliolata. *Stamina* 4, glabra, filamentis 2 mm. longis, antheris oblongis 0·75 mm. longis. *Carpella* 4, rudimentaria.

Doi Sutep, 900 m., *Kerr* 3224.

Gynostemma siamica, *Craib* [Cucurbitaceae-Gynostemmeae]; ab affini *G. laxa*, Cogn., petalis saltem floris masculi haud subulato-acuminatis distinguenda.

Caules graciles, plurisulcati, nodos prope pubescentes, internodiis pilis perpaucis hic illic instructi. *Folia* trifoliolata, petiolo 3·5-6·5 cm. longo crispatim pubescente suffulta; foliola terminalia saepe parum inaequilateralia, plerumque subrhomboidea, apice breviter mucronata, 8-10 cm. longa, 4-4·7 cm. lata, petiolulo vix distincto vel ad 1 cm. longo suffulta, lateralia valde inaequilateralia, latere altero dimidiatim ovata, basi rotundata vel truncata, altero dimidiatim lanceolata vel oblanceolata, basi attenuata, apice mucronulata, 4·5-8 cm. longa, ad fere 4 cm. lata, breviter vel vix distincte petiolulata, omnia membranacea

vel tenuiter chartacea, pagina superiore pilis breviusculis rigidis hic illic instructa, inferiore pilis similibus sed plerumque costa nervisque tantum instructa, nervis lateralibus utrinque 5-8 pagina utraque conspicuis, nervulis supra obscuris subtus interdum paucis subconspicuis interdum obscuris, margine distanter haud alte serrulata, serrulis hydathodo apiculatis. *Flores* masculi in paniculas axillares folia subaequantes vel iis paulo longiores dispositi, ramulis ultimis densifloris, floribus parvis breviter pedicellatis. *Calycis* lobi oblongi, obtusi, 0·75 mm. longi, circa 0·3 mm. lati. *Corolla* expansa circa 3 mm. diametro, viridis (ex *Kerr*), petalis plus minusve ellipticis apice acutis breviterve acuminatis. *Androecium* circa 1 mm. altum, glabrum. *Fructus* globosus, viridis, circa 5 mm. diametro, seminibus subobovatis stramineis vel brunneo-stramineis corrugatis compressis 3-3·5 mm. longis lateribus sulcatis.

Doi Sutep, 690-900 m., evergreen jungle, *Kerr* 747, 1434, 2696.

Schefflera (Heptapleurum) siamensis, *W. W. Sm.* [Araliaceae-Panaceae]; species affinis *S. singalangensi*, Seem., *S. latifoliolatae*, King, et *S. venulosae*, Harms, ab omnibus quibus foliis subtus dense albo-tomentosis differt.

Arbor parva, circa 6 m. alta (ex *Kerr*); rami crassissimi, reliquis vaginarum valde corrugati, ad apicem latum fulvo-tomentosi. *Folia* petiolo ad 13 cm. longo albo-tomentoso tarde glabrescente praedita; vaginae latae, coriaceae, corrugatae; foliola 5-7, petiolulo circa 2·5 cm. longo subtus tomentoso suffulta, ad 20 cm. longa, ad 12 cm. lata, late elliptica, apice rotundata, nunc breviter et abrupte acuminata, nunc emarginata, basi rotundata, breviter cordatula, margine integra, sicco coriacea, supra pallide viridia, sublucida, glabra, infra dense albo- vel fulvido-tomentosa; costa media subtus prominens, albo-tomentosa; nervi 9-10-paria, utrinque manifesti; nervuli supra bene reticulati, infra tomento subcelati. *Paniculae* fructiferae tantum visae, laterales, pauciramosae, circa 7 cm. longae, ramulis primo albo-tomentellis tandem subglabris; pedicelli fructiferi inarticulati, circa 1 cm. longi. *Fructus* globosus, circa 8 mm. diametro, 10-12-locularis, rugis 10-12 alte notatus, stylis brevissimis haud connatis coronatus.

Doi Chieng Dao, 1650-1770 m., common on rocks, *Kerr* 2281.

Lysimachia lancifolia, *Craib* [Primulaceae-Lysimachieae]; a *L. ramosa*, Wall., cui affinis, caulibus vix glaberrimis haud alatis inter alia recedit.

Caules annui, erecti, circa 50 cm. alti, parce ramosi, sulcati, juventute glandulis parvis saepissime rubris breviter stipitatis densius tecti, glandulis mox plus minusve deciduis, superne virides, inferne pallidi brunnescentesve. *Folia* lanceolata, apice in apiculum gradatim angustata, basi attenuata vel subacuminato-attenuata, ad 6·5 cm. longa et 1·6 cm. lata, membranacea, supra viridia, pilis albis breviusculis subcrassis rubro-capitatis hic illic instructa praetereaque glandulis iis caulium similibus sparsissime ornata, subtus parum pallidiora, glandulis parvis iis caulium similibus sparse instructa, nervis lateralibus utrinque

4-5 obliquis supra saepe parum impressis subtus cum costa promineutibus, nervulis paucis subtus subprominulis, margine anguste revoluta, papillosa; petioli lamina decurrente superne alati, circa 1 cm. longi, supra canaliculati, cum caulibus glandulosi. *Flores* axillares, solitarii; pedicelli infructescentes saepissime 3-3·5 cm. longi, graciles, apicem versus incrassati, sparse glandulosi. *Calyx* in fructu persistens, 5-partitus, segmentis ovatis vel ovato-lanceolatis caudatis vix 3 mm. longis circa 1 mm. latis glanduloso-ciliatis dorso parce glandulosis. *Corolla* ignota. *Capsula* 5-valvis, calyce fere dimidio longior, glabra; semina fusca vel atro-rubra, angulata.

Doi Sutep, 1520 m., in evergreen jungle, *Kerr* 3132.

Damrongia, *Kerr*, gen nov. [Gesneraceae-Didymocarpeae]; a *Didymocarpo* calyce bilabiato recedit.

Calyx bilabiatus, labio postico trilobato antico bilobato, lobis posticis quam anticis paulo longioribus et conspicue latioribus mediano lateralibus maiore. *Corolla* exserta, tubo calyci subaequilongo superne inflato, limbo bilabiato, labio postico bipartito antico postico longiore paulo ultra medium in lobos tres inter se subaequales diviso. *Stamina* duo antica fertilia inclusa, filamentis paulo supra corollae tubi basem insertis rectis complanatis glabris, antheris cohaerentibus earum loculis divergentibus, rimis mox confluentibus; stamina lateralia ad staminodia redacta, postico [an semper?] omnino deficiente. *Discus* brevis, pistilli basem cingens. *Ovarium* superum, in calycis tubo inclusum, placentis intrusis bifidis facie exteriore multiovuliferis; stylus elongatus, stigmate obliquo apice emarginato. *Capsula* in calyce inclusa, valvis rectis demum ad summum apicem liberis.—*Herba* perennis, foliis omnibus basalibus membranaceis viridibus vix glabris penninerviis margine serratis saltem exterioribus longius petiolatis, pedunculis uni- vel pluri-floris, bracteis viridibus, floribus albis purpureo-lineatis mediocribus distincte pedicellatis.

Species unica siamensis.

Damrongia purpureo-lineata, *Kerr*.

Folia rosulata, quoad formam variabilia, plerumque obovata, elliptico-obovata, suboblonga vel rhomboideo-ovata, apice obtusa, rarius rotundata, basi cuneata, saepe inaequilateralia, usque ad 9 cm. longa et 5·8 cm. lata, membranacea, supra viridia, sparse albo-setulosa, subtus pallidiora, sparse sed ad costam nervosque densius adpresse brunneo-hirsutula, nervis lateralibus utrinque 4-5 supra subconspicuis parum elevatis subtus cum costa prominentibus paribus duobus infimis prope basem aggregatis obliquis primo rectis vel subrectis dein marginem versus prorsus curvatis, nervulis omnino obscuris, margine, parte basali excepta, subregulariter serrata; petioli usque ad 7 cm. longi, plurisulcati, supra canaliculati, pilis rigidis prorsus directis brunneis tecti. *Pedunculi* uni- vel pluri-flori, 3-5 cm. alti, indumento ei petiolorum simili tecti; bracteae lanceolatae, basi cuneatae, apice subacutae, 5 mm. longae, 2 mm. latae, virides, supra glabrae, subtus sparse brunneo- vel albo-setulosae; pedicelli 6-8 mm. longi, sparse

adpresse brunneo-setulosi. *Calyx* extra sparse adpresse brunneo-setulosus, 1 cm. longus, lobo postico lanceolato-deltoideo 4 mm. longo 2·5 mm. lato, lateralibus late lanceolatis vix 3·5 mm. longis 1·75 mm. latis, infimis angustius lanceolatis 2·75 mm. longis 0·8 mm. latis, lobis omnibus hydathodo subobtusis intra setulis perpaucis brevibus albis instructis margine pilis longiusculis transverse septatis distanter ciliatis, tubo postice 6 mm. antice 5 mm. longo. *Corollae* extra glabrae tubus elongatus, postice 1 cm. longus, pilis paucis crassus brevibus apice instructus; labium posticum e lobis duobus liberis apice rotundatis 4·5 mm. longis 3 mm. latis constitutum, anticum circa 7 mm. longum, 3-lobatum, lobis inter se subaequalibus oblongis apice rotundatis 4·5 mm. longis 3·5 mm. latis. *Stamina* duo antica fertilia filamentis 5·5 mm. supra corollae tubi basem insertis complanatis rectis 2·5 mm. longis glabris, antheris 1·5 mm. longis glabris cohaerentibus, loculis divergentibus rimis cito confluentibus; stamen posticum omnino deficiens, lateralibus ad staminodia circa 1·25 mm. longa glabra redactis. *Discus* vix 0·5 mm. altus. *Ovarium* in calycis tubo inclusum, 3 mm. altum, superne paucisetulosum, stylo stigmate incluso 9 mm. longo breviter subsparse setuloso, stigmate obliquo emarginato. *Capsula* 5-7 mm. longa, in calyce inclusa, valvis demum ad summum apicem liberis.

Gorge below Ban Kaw, c. 195 m. Flowers white with purple lines in throat; on damp rocks in jungle, *Kerr* 2196.

The plant here proposed as the type of a new genus, though undoubtedly closely allied to *Didymocarpus*, could not be satisfactorily placed in that genus or even in the genus formed by the union of *Didymocarpus* and *Chirita*, as proposed by some authorities. The habit, short fruit and calyx, separate it from any of the types at present represented in *Didymocarpus*. In degree—though not in kind—of divergence of habit and in its calyx *Damrongia* bears the same relationship to *Didymocarpus* as *Dichiloboea* to *Boea*.

The genus has been named in honour of H. H. Prince Damrong, who, himself interested in scientific pursuits, has done so much for the advancement of education in his country.

Petrocosmea Kerrii, *Craib* [Gesneraceae-Cyrtandreae]; a speciebus sinensibus foliis magnis facile distinguenda.

Herba acaulis; rhizoma satis crassum, breve, radicibus permultis rigide fibrosis. *Folia* rosulata, ovato-lanceolata, oblongo-elliptica vel rarius oblonga, interiora saepe suborbicularia, apice saepius obtusa, rarius acuta vel breviter subacuminata, basi cuneata vel cordata sed saepissime inaequialta, latere altero cuneata vel fere truncata, altero rotundata, semicordata, exteriora usque ad 10 cm. longa et 6 cm. lata, interiora multo minora, membranacea vel fere chartacea, pagina utraque pilis albis basi tumidis longiusculis dense ornata praetereaque subtus glandulis nitidis satis numerosis ornata, nervis lateralibus utrinque 4-6 pagina utraque subconspicuis vel inferiore conspicuis, nervulis paucis interdum subtus subconspicuis, margine irregulariter crassius denticulata vel serrato-denticulata; petioli foliorum exteriorum usque ad 9·5 cm. longi, satis validi, pilis

pallide brunneis longis transverse septatis divaricatis flaccidis tecti; petioli foliorum interiorum multo breviores, graciliores, indumento albo sparsius instructi. *Pedunculi* in plantis majoribus 3·5-4·5 cm. longi, cymam umbelliformam 3-florem gerens, pedicellis 1-1·3 cm. longis, in plantis minoribus saepissime uniflori, circa 3 cm. longi, pedunculis pedicellisque indumento ei petiolorum simili instructis. *Calyx* dorso pilis longis albis transverse septatis flaccidis pilosus, intra glaber; labium posticum fere ad medium 3-lobatum, vix 5 mm. longum, lobis oblongo-lanceolatis acutis 2 mm. longis 1·75 mm. latis margine paucidentatis pauperrime longe ciliatis, lobis duobus anticis in unum apice emarginatum connatis vel interdum fere ad basem liberis. *Corollae* tubus 3 mm. longus; labium posticum subquadratum, 6 mm. longum, 7·5 mm. latum, e lobis duobus connatis constitutum, lobis 2 mm. longis 3·5 mm. latis, anticum 7 mm. longum, 3-lobatum, lobis 4·75-5 mm. longis et 3·75-4 mm. latis, lobulis omnibus apice rotundatis margine pilis transverse septatis albis pauciciliatis extra breviter sparse albo-pilosis intra ad maculas glanduloso-furfuraceis. *Filamenta* prope corollae tubi basem inserta, 1·5 mm. longa, medio subitius expansa, inferne complanata, superne teretia, basi apiceque exceptis glanduloso-furfuracea; antherae apice conniventes, sagittatae, apice obtuse caudato-acuminatae, acumine incluso 3 mm. longae, loculis infra filamenti insertionem liberis; staminodia tria, parva, linearia. *Ovarium* 2 mm. altum, adpresse albo-pilosum, stylo terete 6·5 mm. longo apice glabro inferne glanduloso-furfuraceo et pilis paucis longis ornato, stigmate parvo capitato.

Doi Sutep, damp rocks in evergreen jungle, 1560 m., flowers white, two upper lobes with yellow patch at base, *Kerr* 3361.

Ruellia bella, *Craib* [Acanthaceae-Ruellieae]; a *R. suffruticosa*, Roxb., corolla longiore, a *R. macrosiphone*, Kurz, foliis latioribus recedit.

Fruticulus subacaulis. *Folia* approximata, oblonga, oblongo-elliptica vel oblongo-lanceolata, apice interdum subacuminata, obtusa, basi cuneata lateve cuneata, ad 7 cm. longa et 2·8 cm. lata, rigide chartacea, supra viridia, lineolata, pilis longiusculis pluriseptatis nitido-albis sparse instructa, subtus pallidiora, pilis iisdem ornata, nervis lateralibus utrinque 4-6 supra subconspicuis subtus cum costa prominulis, nervulis paucis subtus subprominulis, margine pilis albis septatis longe et dense ciliata. petiolo ad 1 cm. longo pilis iisdem subdense tecto suffulta. *Flores* axillares, solitarii vel bini, pedicellis brevibus vel sub anthesin ad 1 cm. longis indumento ei petiolorum simili tectis suffulti, pedicellis infructescentibus usque ad 2·5 cm. longis; bracteolae binae, foliaceae, oblongae vel oblongo-ovatae, ad 1·8 cm. longae et 1 cm. latae, sessiles, indumento ei foliorum simili tectae. *Calyx* viridis, persistens, circa 5 mm. longus, segmentis lanceolatis apicem versus gradatim attenuatis summo apice subacutis dorso medio inferne pilis paucis albis rigidis instructis intra pilis paucis brevibus tectis longius ciliatis rigidis. *Corolla* alba, nocte expansa (ex *Kerr*), extra basi excepta albo-pubescens, 5·2 cm. longa; tubi pars inferior cylindrica 2·3 cm. longa, circa

1·5 mm. diametro; lobi 5, inter se subaequales, plus minusve late elliptici vel late obovato-elliptici, apice rotundati, usque ad 1·1 cm. longi et 1·1 cm. lati, longius ciliati. *Stamina* fertilia 4, duobus longioribus tubi apicem vix attingentibus, filamentis glabris fere ad apicem tubi partis cylindricae affixis; antherae circa 2·25 mm. longae. *Ovarium* 3 mm. altum, nisi apice, ubi sparse pubescens, glabrum; stylus circa 4 cm. longus, setulosus.

Mê Măw, deciduous jungle, 300 m., *Kerr* 3605.

Asystasia salicifolia, *Craib* [Acanthaceae-Justicieae]; species floribus magnis, foliis saepissime elongatis cognoscenda.

Herba circiter 40 cm. alta, radice lignosa; caulis primo pilis albidis hic illic parcissime instructus, mox glaber, sicco pallide viridis, quadrisulcatus. *Folia* forma variabilia, plerumque late oblanceolata, oblanceolata vel linearia, apice acuminata, acuta vel acutiuscula, basi saepius cuneata, latiora circiter 10 cm. longa et 3·5 cm. lata, angustiora circiter 12 cm. longa et 1 cm. lata, chartacea vel membranaceo-chartacea, pagina utraque pilis longiusculis parce instructa, margine parum revoluta, pilis brevioribus rigidioribus scabridula, nervis lateralibus utrinque 7-10 pagina utraque conspicuis vel subprominulis; petioli breves vel usque ad 7 mm. longi. *Racemi* terminales, simplices, secundi, pedunculo incluso ad 5 cm. longi; pedicelli usque ad 3 mm. longi, pilis brevibus glanduloso-capitatis instructi; bracteae anguste deltoideae, acutae, circiter 2 mm. longae, rigidae, costatae; bracteolae binae, ad pedicelli basem positae, bracteis similes nisi minores. *Calycis* segmenta inter se subaequalia, linearia, acuminata, acuta, usque ad 8 mm. longa et 1·5 mm. lata, dorso pilis paucis saepissime glanduloso-capitatis instructa, apice breviter ciliolata. *Corolla* alba, purpureo-maculata (ex *Kerr*), vix 3·5 cm. longa, extra parce breviter pilosula, intus inferne ad nervos parce pubescens, lobis imbricatis apice rotundatis 7 mm. longis et 6-9 mm. latis. *Stamina* longiora corollae tubum paululo superantia, filamentis inferne parce pubescentibus; antherarum loculi circiter 2·5 mm. longi, basi distincte caudati. *Ovarium* dense pubescens et glandulosum, stylo inferne pilis divaricatis instructo.

Doi Sutep, open jungle, 1050 m., *Kerr* 1488.

Vitex Pierrei, *Craib* [Verbenaceae-Viticeae]; ab affini *V. canescente,* Kurz, pedicellis brevibus recedit.

Ramuli juventute densius molliter pubescentes, mox magis minusve glabrescentes, quadrangulares, demum glabri, teretes, cortice cinereo-brunneo obtecti, lenticellis numerosis haud valde conspicuis. *Folia* digitatim 5-foliolata, rarissime 3-foliolata, petiolo communi 3-7 cm. longo dense molliter pubescente suffulta; foliola ovata, oblonga, oblanceolato-obovata obovatave, apice acuminata vel caudato-acuminata, summo apice acuta, basi in petiolum attenuata, cuneata vel late cuneata, usque ad 7·5 cm. longa et 3·8 cm. lata, terminali aliis majore, duobus infimis interdum parvis saepe deciduis, chartaceis, pagina superiore pilis albis basi tuberculatis sparse nisi marginem versus ubi densius instructa, inferiore molliter pubescentia, praesertim ad

costam nervosque praetereaque aureo-glandulosa, nervis lateralibus utrinque 8-10 supra conspicuis subtus prominulis, margine irregulariter pauciserrata vel integra, petiolulis usque ad 2 cm. longis molliter pubescentibus suffulta. *Inflorescentia* ei *V. canescentis* persimilis nisi pedicellis minoribus, rhachi molliter pubescente et aureo-glandulosa; bracteae parvae, fugaces; pedicelli sub anthesin circa 1 mm. longi, ut calyx adpresse hirsutuli et aureo-glandulosi. *Calyx* 3·5 mm. longus, intra superne setulis paucis adpressis instructus, lobis inter se subaequalibus deltoideis acutis vel obtusis 0·75 mm. longis ciliatis. *Corolla* in alabastro extra breviter pubescens et densius aureo-glandulosa, sub anthesin 7 mm. longa; tubi pars basi cylindrica 2 mm. longa; labium supremum 2 mm. longum, ad medium bilobatum, lobulis apice rotundatis vix 1 mm. longis et 1·5 mm. latis; labium infimum 3-lobatum, lobo mediano lateralibus majore 2·75 mm. longo. *Stamina* exserta; filamenta basi papillosa. *Ovarium* apice dense glandulosum, 1 mm. altum, stylo filamentis longioribus subaequilongo apice bifido.

Sriracha, 4·5 m., *Mrs. D. J. Collins* 72.

Distr. Cochinchina, *Pierre* 1839.

Elsholtzia Winitiana, *Craib* [Labiatae-Satureineae]; *E. blandae,* Benth. et *E. ochroleucae,* Dunn, valde affinis sed spicis densioribus inter alia distinguenda.

Plana perennis, ad 3 m. alta; rami (caulesve?) juventute pallidi, dense crispatim albo-pubescentes praetereaque rubro-glandulosi, mox brunnescentes, sparsius pubescentes, glandulis persistentibus. *Folia* lanceolata vel ovato-lanceolata, utrinque angustata vel interdum basi latius cuneata, summo apice mucronulata, ad 11·5 cm. longa et 3·8 cm. lata, chartacea vel membranaceo-chartacea, pagina superiore viridia, pilis brevibus albis sparse instructa, inferiore pallida, praesertim ad costam nervos nervulosque albo-pubescentia praetereaque glandulis rubris et aureis densius ornata, nervis lateralibus utrinque 6-9 adscendentibus intra marginem anastomasantibus supra conspicuis saepe parum impressis subtus prominentibus, nervulis subtus prominulis supra interdum parum impressis, margine parte basali excepta distantius crenato-serrata, parum revoluta, superiora subsessilia, inferiora petiolo ad 1·5 cm. longo supra late canaliculato densius crispatim albo-pubescente et glanduloso suffulta. *Spicae* in axillis foliorum superiorum solitariae, simplices, rarissime furcatae, cylindricae, 4-6 cm. longae, circa 5 mm. diametro, densiflorae, pedunculo communi 2-3 cm. longo indumento ei ramorum juvenilium tecto suffultae; bracteae oblongo-oblanceolatae, apice longe acute acuminatae, 3·25 mm. longae, 1 mm. latae, dorso pubescentes et glandulosae, intra glabrae, ciliatae, alabastra superantes; bracteolae bracteis similes nisi minores. *Calyx* vix 1·5 mm. longus, ore obliquo, inaequaliter lobatus, lobis plus minusve deltoideis acutis usque ad 0·5 mm. longis ciliatis, extra pubescens et glandulosus. *Corollae* tubus 1·5 mm. longus; labium anticum intra apice pilosum et glandulosum, posticum antico longius, circa 0·75 mm. longum, apice intra pilosum et glandulosum. *Stamina* bene

supra corollae tubi medium affixa, glabra. *Stylus* glabra, apice 2-fidus.

Doi Sutep, in mixed jungle, 660 m.; flowers greenish, aromatic, *Kerr* 1607B.

Croton siamensis, *Craib* [Euphorbiaceae-Crotoneae]; a *C. oblongifolio*, Roxb., inflorescentia dense argenteo-lepidota distinguendus.

Arbuscula (ex *Kerr*), ramulis primo densissime brunneo-lepidotis mox pallide brunneo- vel fere cinereo-corticatis. *Folia* saepissime oblonga vel oblongo-lanceolata, apice obtusa, breviter mucronata, basi rotundata vel cuneato-rotundata, ad 23 cm. longa et 7·5 cm. lata, chartacea vel saepius rigide chartacea, supra glabra, subtus pallidiora, distanter nisi ad costam densius lepidota, praetereaque facie utraque nigro- vel fusco-punctata, nervis lateralibus utrinque 10-15 rectis intra marginem anastomosantibus pagina superiore subconspicuis inferiore prominulis, nervulis subtus conspicuis vel subprominulis, margine distanter glanduloso-denticulata, petiolo ad 4·5 cm. longo densissime lepidoto supra canaliculato summo apice latere utroque glanduloso suffulta; stipulae subulatae, circa 3 mm. longae, deciduae. *Racemi* ad apices ramulorum aggregati, numerosi, circa 23 cm. longi, fere sessiles, densissime argento-lepidoti, mox brunneo-lepidoti, bracteis 1-2 mm. longis deciduis vel saepe flore delapso persistentibus, inferne flores ♀ superne flores ♂ gerentes, floribus subsessilibus vel breviter pedicellatis. *Fl.* ♂. *Calyx* intra superne parce albo-pubescens, vix 3 mm. longus, fere ad basem 5-partitus, segmentis deltoideis acutiusculis ciliatis. *Petala* 5, 2·75 mm. longa, 0·75 mm. lata, densius villoso-ciliata, dorso lepidibus stellatis paucis magnis ornata, supra parce pilosa. *Disci* glandulae calycis segmentis oppositae, 1 mm. latae, carnosae, glabrae, albidae. *Stamina* 10-12, 4 mm. longa, oppositipetala basi parcissime piloso-barbata vel interdum fere glabra, oppositisepala inferne gradatim densius villoso-barbata, connectivo lato. *Receptaculum* villosum. *Fl.* ♀. *Calyx* ei maris similis. *Disci* glandulae petaloideae, 1·75 mm. longae, vix 0·5 mm. latae, ciliatae. *Ovarium* dense stellato-lepidotum, stylis simpliciter divisis.

Srirăcha, Nawng Yai Bu, 15 m., common in evergreen and scrub jungles, *Kerr* 2146. Srirăcha, c. 6 m., very common, *Mrs. D. J. Collins* 239; ibid., c. 3 m., *Mrs. D. J. Collins*, 224.

Siamese name, Mai plau (ex *Kerr*).

Dalechampia elongata, *Craib* [Euphorbiaceae-Plukenetieae]; species nova foliis trifoliolatis, foliolis elongatis cognoscenda.

Caules volubiles, herbacei, fistulosi, virides, sulcati, juventute pilis brevibus albis crispis dense tecti praetereaque pilis paucioribus longioribus divergentibus instructi. *Folia* trifoliolata, petiolo communi ad 6 cm. longo sulcato indumento ei caulium simili tecto suffulta; stipulae diu persistentes, cito reflexae, lanceolatae, acutae, 4 mm. longae, dorso breviter crispatim pubescentes, margine longius ciliatae; foliola plus minusve lanceolata vel lateralia latere altero dimi io

anguste lanceolata, altero dimidio ovato-lanceolata, apice longe gradatim attenuata, summo apice costa excurrente breviter apiculata, basi acuminata, subacuminata vel lateralia latere exteriore rotundata, usque ad 15·5 cm. longa et 4·3 cm. lata, chartacea, supra pilis albis longiusculis basi tumidis mollibus vix dense instructa, subtus pallidiora, brevius molliter pubescentia, nervis lateralibus utrinque circa 15 supra cum costa pallescentibus subprominulis subtus prominulis intra marginem anastomosantibus, costa subtus prominente, fere integra nisi lateralia latere exteriore ubi latissima crasse pauci-dentata, margine anguste recurva, densius ciliolata, subsessilia vel petiolulo usque ad 6 mm. longo suffulta. *Inflorescentia* androgyna, ramulum axillarem unifoliatum ad 10 cm. longum terminans, pedunculo ad 7 cm. longo indumento ei caulium simili tecto suffulta, basi bracteis duabus foliis similibus nisi minoribus et paulo ultra medium lobatis vel fere ad basem partitis vix oppositis ornata, bractea quaque stipulis duabus iis foliorum similibus instructa, floribus ♀ ad bracteae inferioris basem, floribus ♂ ad bracteae superioris basem sitis. *Flores* ♂ basi bracteis duabus oblatis circa 5 mm. longis et 9 mm. latis pagina utraque puberulis pauperius ciliolatis cincti; alabastra depresso-globosa, puberrula; pedicelli circa 2 mm. longi, sub apice articulati. *Calyx* in segmenta 5 inter se vix aequalia ovato-elliptica apice incrassata subcucullata 4 mm. longa crassa intra basi pubescentia partitus. *Stamina* numerosa, filamentis circa 0·75 mm. longis parce pubescentibus, antheris vix 1·25 mm. longis, loculis parallelis. *Inflorescentia* ♀ triflora, floribus basi bracteis tribus membranaceis dorso puberulis et parce pubescentibus margine longe ciliatis una subquadrata apice cuspidato-acuminata 6·5 mm. longa et 7 mm. lata, aliis apice subtruncatis fere dimidio minoribus arcte cinctis pedicellis 1-1·75 mm. longis puberulis et parce pubescentibus suffultis. *Sepala* 5, inter se vix aequalia, tentactuligero-fimbriata, ad 2·5 mm. longa et 2 mm. lata, dorso puberula, ciliata, crassa. *Ovarium* 3-lobatum, circa 1 mm. altum, longius puberulum; stylus 9·5 mm. longus, basi puberulus.

Mê Măw, 300 m., climbing perennial in deciduous jungle, *Kerr* 3632.

Celtis (**Solenostigma**) **Collinsae,** *Craib* [Urticaceae-Celtideae]; a *C. philippinense*, Blanco et *C. strychnoide*, Planchon, nervis lateralibus basalibus foliorum apices haud attingentibus, nervis lateralibus superioribus e costa ortis subtus prominentibus facile distinguenda.

Arbor parva; ramuli juventute puberuli, sicco plus minusve fuscescentes, demum glabri, cinereo-corticati. *Folia* oblongo-ovata vel elliptico-ovata, apice acuminata, summo apice obtusa, breviter apiculata, basi saepe inaequilateralia, cuneata, rotundato-cuneata vel maiora rotundata, usque ad 8 cm. longa et 5·4 cm. lata, coriacea, primo subtus ad nervos sparse subsericea et supra marginem versus et basi puberula, demum glabra, e basi trinervia, nervis duobus lateralibus foliorum apices haud attingentibus cum

costa supra conspicuis subtus valde prominentibus, nervis e costa ortis patulis vel fere patulis subtus prominentibus intra marginem anastomosantibus, margine integra, recurva; petioli circa 1 cm. longi, supra canaliculati, primo puberuli, demum glabri vel fere glabri; stipulae fugaces, 4 mm. longae, basi productae, dorso puberulae. *Cymae* axillares, foliis multo breviores, ramulis puberulis, floribus fere sessilibus. *Fl.* ♂. *Sepala* 5, obovata, 1·5 mm. longa, vix 1·5 mm. lata, membranacea, ciliata. *Disci* glandulae parvae. *Stamina* sepalis opposita, filamentis glabris sepalis subaequilongis; antherae vix 1 mm. longae, apice saepius breviter apiculatae. *Ovarii* rudimentum parvum, columnare, glabrum.

Srirăcha, on bank above rocks and beach, *Mrs. D. J. Collins*, 230, 241—the latter with deformed flowers.

Gironniera longifolia, *Craib* [Urticaceae-Celtideae]; a *G. subaequali*, Pl., foliis longioribus tenuioribus parte superiore serratis recedit.

Arbor 12-15-metralis (ex *Kerr*); ramuli juventute brunnei vel fusco-brunnei, dein pallide corticati, primo pilis longis rigidis pallidis tumidis copiose instructi, mox glabri. *Folia* oblongo-elliptica vel lanceolato-elliptica, apice acute caudato-acuminata, basi cuneata vel late cuneata, saepe inaequilateralia, usque ad 26·5 cm. longa et 9·7 cm. lata, rigide chartacea, pagina superiore ad costam sparse et inferiore ad costam nervosque laterales densius pilis iis ramulorum similibus instructa praetereaque subtus setulis sparsis ad nervulos aspera, nervis lateralibus utrinque 9-12 intra marginem anastomosantibus supra conspicuis subtus prominentibus, nervulis rete conspicuum subtus efficientibus, parte saltem triente basali excepta serrata vel serrato-dentata, petiolo circa 6-10 mm. longo supra canaliculato indumento ei ramulorum simili tecto suffulta; stipulae cito deciduae, circa 1·5 cm. longae, dorso margine pallido lato excepto pilis et longis et brevibus rigidis pallidis tectae, intra glabrae. *Inflorescentiae* axillares et ♂ et ♀ e basi ramosae. *Fl.* ♂ breviter pedicellati, 5-meri. *Sepala* quoad formam variabilia, saepius obovata oblongae, apice rotundata, circa 1·75 mm. longa et 1·3 mm. lata, ciliolata, dorso setulis perpaucis instructa, basi incrassata. *Filamenta* 1·75 mm. longa, glabra; antherae superne attenuatae, 1·5 mm. longae, apice et lateribus setulosae. *Ovarii* rudimentum breve, villosum. *Fl.* ♀ plerumque distincte pedicellati, rarius subsessiles. *Sepala* iis maris similia sed paululo maiora. *Ovarium* circa 5 mm. altum, adpresse albo- vel brunneo- setulosum; styli rami 2, circa 1·5 cm. longi. *Fructus* drupaceus, ambitu ovatus vel orbiculari-ovatus, compressus, 8-9 mm. longus, sparse adpresse setulosus.—? *G. subaequalis*, Pl., var. *birmanica*, Hook. f., Fl. Brit. Ind., v. p. 486.

Doi Wao, 900 m., in evergreen jungle, *Kerr* 2439 (♀), 2439 A (♂).

Probably referable to this species is *Toppin* 4061 from Upper Burma.

XXXVI.—MISCELLANEOUS NOTES.

Letter from the Minister of the Belgian Colonies.—The following letter from the Minister of the Colonies, Belgium, has been received by the Director:—

Royaume de Belgique,
Ministère des Colonies,
Londres, le 10 décembre, 1918.

Monsieur le Directeur,

Les services du Ministère des Colonies qui, pendant près de quatre ans ont fonctionné à Londres, rentrent à Bruxelles vers la fin de cette semaine.

Je ne veux pas quitter le Royaume Uni sans vous exprimer ma vive gratitude pour l'assistance particulièrement aimable que vous avez daigné accorder aux fonctionnaires de mon département.

Les rapports qui ont existé entre votre établissement et le Ministère des Colonies ont toujours été empreints de la plus grande cordialité, et je tiens spécialement à rendre hommage à la courtoisie dont vous n'avez cessé de faire preuve à l'égard de mes délégués qui se sont permis de faire appel à votre haute compétence.

Je vous saurai gré de bien vouloir remercier les fonctionnaires sous vos ordres qui se sont montrés toujours très empressés à assister mon personnel.

Je vous prie d'agréer, Monsieur le Directeur, l'assurance de ma considération la plus distinguée.

Presentations to Museums.—The following miscellaneous specimens have been received in addition to those previously recorded in the *Bulletin*:—

Superintendent, Botanic and Forestry Department, Hong Kong.—Seeds of *Strychnos angustiflora*, *Strychnos paniculata*, and of *Momordica cochinchinensis*.

Mr. S. T. Heard, Tahilla, Co. Kerry.—Portion of stem of *Cordyline australis*.

Mr. I. B. Pole Evans, Department of Agriculture, Pretoria.—Barks of *Erythrophloeum guineense*, and of *Croton* sp.

Lt.-Col. E. R. Wayland.—Sample of Linseed from Japan.

Sir Archibald Buchan-Hepburn, Bart., Prestonkirk, N.B.—Plank of *Abies amabilis*.

Messrs. Ide and Christie, Crutched Friars, London, E.C.—Fibre from *Hypoxis rigidula*, South Africa.

Sir John Brunner, Bart., Silverlands, Chertsey.—Plank of *Sequoia gigantea*.

Mr. R. T. Gunther, Magdalen College, Oxford.—Section of a large Elm from the grounds of the College.

Miss A. E. Beasley, Park Road, Teddington.—Fruit of *Strychnos spinosa*, B.E. Africa.

Mr. N. Gosling, Chaco, Paraguay.—Seeds of *Ilex Paraguayensis*.

Lady Blake.—Section of wood of *Cecropia peltata*, Jamaica.

Lieut.-Col. W. Dixon, The Castle, St. Helena.—Fibre and tow extracted from plants of *Alpinia nutans*.

Sir Edmund G. Loder, Bart., Leonardslee, Horsham.—Upright growing stem of *Arctostaphylos media* and grafted stem of a Rhododendron.

Director, Botanic Gardens, Singapore.—Specimens of wood of *Ormosia macrodisca*, *Castilloa elastica*, and *Diospyros bilocularis*.

Mr. A. E. Pratt, Kingston Road, Teddington.—Photograph of *Myrmedoma arfakiana*, New Guinea.

Mr. A. C. Miles, Senior Curator, Agricultural Department, Gold Coast.—Photograph of the Royal Palm Avenue, Tarkwa, also fruits of Broke-back (*Chailletia toxicaria*).

Capt. H. T. Last, London, W.C.—Sample of rope made by the Germans from the inner bark of the Lime (*Tilia vulgaris*), for hauling heavy minenwerfer.

Messrs. Farrell and Co., Caledonian Road, London, N.—A complete set of material to illustrate the manufacture of the English violin, violoncello, and bow. Placed in Museum No. IV.

The Earl of Eldon.—Branch with cones of *Cupressuus macrocarpa* var. *lutea*, from Encombe, Corfe Castle, Dorset.

Curator, Botanic Garden, Dominica.—Seeds of the Shea butter tree (*Butyrospermum Parkii*), grown in the Botanic Garden, Dominica.

Curator, Agricultural Department, Old Calabar.—Sample of hand-made twine from fibre of *Agave sisalana*, grown in the Economic Gardens, Old Calabar.

Messrs. Wigglesworth and Co., Fenchurch Street, London, E.C.—Samples of fibre from *Cannabis sativa*, Wisconsin; *Furcraea Cabuya*, *integra*, Costa Rica; *Furcraea macrophylla*, Peru; and *Furcraea* sp., Colombia.

Mr. M. T. Dawe, San Lorenzo, Colombia.—Seeds of Ortoba (*Myristica Otoba*). A fatty oil extracted from the seeds is highly valued in Colombia for application in certain skin diseases of animals, also for the treatment of ticks in cattle. J. M. H.

"Kyov" or "Kev" plant of Kashmir.—A few months ago Sir George Grierson wrote to Kew as follows.—"There is a plant growing in Kashmir called 'kyov' or 'kev,' which native authorities say grows in marshy ground, and has globular roots (? like a potato tuber). Lawrence ("Valley of Kashmir," p. 72) says it is *Chaerophyllum* sp., and is looked upon as an excellent substitute for carrots. Native authorities add that its uprooting is a long, slow business, and hence 'to root up kyov' is used as a metaphor for 'spending a long time over the completion of anything.' . . . . There is a compound word *kevi-rath*, which native authorities say is 'the creeper of this plant,' *i.e.*, 'an underground fibrous network over a wide area and connecting the roots of this plant.' This, as nearly as I can get it, is a translation of the Sanskrit account sent to me, and I should be most grateful if you could kindly tell me if it is correct, or what

is meant by the 'network' ('jal')." A dried specimen of the plant was eventually obtained for Sir George by Dr. E. Neve, of the Mission Hospital, Srinagar, who writes: "It is possible that the name 'kev' may be used for the different plants, one in the mountains, a *Chaerophyllum*, mentioned by Lawrence. But what is known as 'kev' here in Srinagar is a marsh plant with jointed spreading succulent roots which form a tangled mass called *kevi-rath*. I believe the word *rath* is also used for the tangled roots of potatoes. The word *Jala* in this connection doubtless means 'net'."

The plant forwarded by Dr. Neve is *Sagittaria sagittifolia*, L., (*Alismaceae*), a common aquatic herb in Europe and Asia and throughout North America. According to Watt (Dict. Econ. Prod. Ind., vi. ii. 383), the species is common on the borders of fresh-water lakes, tanks, and ditches throughout India. He remarks that the natives of India are apparently ignorant of its value as a food plant. Smith (Chinese Materia Medica, 189) says that *S. sinensis*, Sims. (=*S. sagittifolia*) is cultivated in some parts of China for the sake of its edible "rhizome" (tubers). This is confirmed by Hance, who writes on his label accompanying a specimen that it is cultivated near Canton for the same purpose. The tubers terminate stolons distinct from the fibrous roots something after the manner of a potato. J. H.

Ranunculus nissanus.—This Serbian species was described by Capt. Petrovič in his Additamenta ad Floram Agri Nyssani, p. 21 (1885). The name is wrongly referred by *Ind. Kew.* Suppl. ii. (1904), to Max Leichtlin, as follows:—"*Ranunculus nyssanus*, Leichtl., in The Garden, lv. (1899), 418, Quid?," probably in reliance on *Kew Bull.* 1900, App. ii. p. 49, where *R. nyssanus* is mentioned under 'New Garden Plants of the year 1899' without an author's name, though with reference to The Garden loc. cit. But what Leichtlin there says is merely that *R. nyssanus* was in beauty in his garden at the moment of writing. He gives no description nor does he name the real author of the species.

Nicholson, Dict. Gard. Century Suppl., p. 632 (1901), repeats the misspelling *nyssanus*, and K. Schum., in Just, Jahresb. xxvii. i. 506, twists it into *nyssanus*! It is odd that Petrovič should have adopted the spelling *Nyssanus* for the title of his book, but *nissanus* for that of his species. As his description is in Serbian the Latin translation offered below may be useful. The Kew library has a copy of the book, and the herbarium a specimen of the plant from Herb. Churchill, labelled "F. Schultz, Herb. Norm. nov. ser. cent. 18, no. 1706. *R. psilostachys*, Griseb. Majo 1883. Ad margines pratorum circa oppidum Nisch, Serbia. Leg. Dr. S. Petrovič," to which Mr. Churchill has annotated, "from Dr. Keck's notes to Cent. 20 and 21 of F. Schultz's Herb. Norm., the plants are not *R. psilostachys*, Griseb., but instead *R. nissanus*, Petrovich."

In the absence of fruits and stolons, characters on which Petrovič relies, I can offer no opinion as to the distinctness of *R. nissanus* from *R. psilostachys*, Griseb., on the one hand and from *R. Tenorii*, Jord., on the other.

Ranunculus nissanus.—Fibrae radicales incrassatae, cylindricae, oblongae, ovoideae, subrotundaeve, prout progressione sua augescunt (according to their stage of development).

Caulis par subterranea stolones subterraneos tenuissimos filiformes, foliis grumisve crassiusculis subrotundis terminatos edens. *Folia radicalia primordialia* autumno aut primo vere edita, postea evanida, ambitu suborbicularia, dentibus 9-10, vel etiam pluribus, latis obtusis leviter insculpta, petiolo brevi suffulta, viridia, pilis sparse vestita. *Folia radicalia seriora* vernalia, albescentia, pilis sericeis adpressis vestita, longe petiolata, usque ad basin in segmenta obovato-cuneata tria divisa, segmento intermedio in lacinias 3-4 integras inaequaliterve dentatas partito, lateralibus fere usque ad medium bilobis, lobis inaequaliter tridentatis. *Folia caulina* breviter petiolata, in segmenta tria integra lobatave partita. *Folia superiora* fere sessilia, in segmenta tria oblonga integra partita. *Caules* cylindrici, pilis furcatis albis sericeis vestiti, superne parum ramosi, ramo saepius unico, rarius ramis duobus tribusve approximatis. *Flores* flavi, lucidi, insignes. *Sepala* 5, oblongo-ovata, externe pilosa, demum reflexa. *Petala* rotundiuscule obovata, sepalis longiora, prope basin nectario squama conspicua operto munita. *Carpella* lateraliter compressa, ovoidea, in rostrum apice uncinatum desinentia, secus spicam cylindricam longiusculum ordinatim disposita.

Serbia.—Dry slopes and by roadsides below Mount Gabrovatz, below the fortress of Kurin, near Nish, opposite Medoshevatz, and near Mramor. Flowering in April and May.

It was described in the Flora Agri Nyssani as *R. psilostachys*, Griseb., but differs therefrom in its less deeply-cut earliest radical leaves, in its caudate carpels, in their beaks, and in its subterranean stolons.

The nearest ally to the Nish plant is *R. cylindricus*, Jord., but this also is very different, owing to its dissected earliest leaves. C. C. LACAITA.

South African Fever Bark.—We are indebted to the kindness of Professor H. G. Greenish for the following note embodying the results of an examination in the Research Laboratories of the Pharmaceutical Society of Great Britain of the bark of *Croton Gubouga*, S. Moore, the botanical identity of which was discussed on an earlier page (*K.B.*, 1918, p. 243). The note has already been published in the Pharmaceutical Journal, Dec. 14, 1918, p. 289.

In an address delivered before the Cape Town Medical Society in 1899 by John Maberley, M.R.C.S., L.R.C.P., the following account is given of a bark used as a remedy for bilious malarial fever by the natives of the low veld between Delagoa Bay and the Letaba Gold Fields:—

"Then there is another drug—one which before this day has never seen the light. This is represented, unfortunately, by no more than a small piece of bark which I exhibit, and which

has a somewhat peculiar history. When I was in charge of the Klein Letaba Gold Fields Hospital in Central Transvaal—one of the very worst districts for malarial bilious fever in South Africa—I had some beans belonging to this same tree given to me which came from a man who had obtained them when travelling through the low veld from Delagoa Bay to the gold fields. The man's story of the beans was interesting. He was an old prospector, accustomed to low country fever, and he stated that when he was passing through the Lebombo Flats he had a violent attack of bilious fever and was laid up at a Kaffir kraal. He had a couple of valuable greyhounds with him which were much noticed by an old Kaffir doctor who came along, and who promised to cure the patient of his fever if he would part with the dogs. The man, who had suffered from similar attacks before, would not agree to this, and stated that he could cure himself. However, getting worse and losing faith in the prospect of his recovery, he sent for the Kaffir doctor and promised him the dogs as a reward for a cure. The old fellow administered some of the beans, with the result that in a couple of days the man was about virtually cured. He got some of the beans from the Kaffir doctor, and a few of them came into my possession. I subjected them to a fair trial. We had 200 white men in the mines, and, as illustrating the unhealthiness of the climate, I might say that during February, March, and April, the workmen just put in one-third of their time. The remainder they took out in fever. After trying the beans and bark I came to the conclusion that a dose of two grains was quite sufficient. This dose, made into a pill with a quarter of a grain of opium, I always rely on to cut short relapses of malarial fever both in my own person and those of my patients. The peculiar action of the drug lay in the fact that it had a most extraordinary power of collecting bile, and if the attack was at all well marked in half an hour the patient not only passed a lot of bile but also vomited a large quantity from the stomach. That, I am certain, is a particularly valuable drug, but I cannot trace it further. I got a few of the beans, and out of six or eight which I planted I obtained one plant. Unfortunately, having to go away, I found on my return that the plant had been destroyed by hail. Afterwards a white man sent me some pieces of bark and a few beans, but they were incapable of germination. Then I tried again, and found that Kaffirs had been told by a native doctor that the trees, which were growing in a mealie field, were bewitched, and had better, therefore, be destroyed. This was done, with the result of a further disappointment. It was a pity that it could not be traced, for it would be a very valuable remedy for the types of fever we get in southern tropical Africa. I have tried in London to analyse the bark with the assistance of a good chemist, but we could make nothing of it."*

A small quantity of this bark was sent to the Royal Botanic Gardens, Kew, and a part was forwarded to me with the request that I would investigate it as far as possible, the botanical examination having been undertaken at Kew. The investiga-

* *Lancet*, 1899, p. 873.

tion was carried out in the Pharmacy Research Laboratory, with the following results:—

The sample consisted of about 150 grammes of the bark and a tin containing about 17 grammes of the powder. The bark was in pieces about 5 to 10 centimetres long, 3 centimetres wide, and 2 to 3 millimetres thick. Externally the younger pieces exhibit alternating longitudinal bands of dark grey and paler grey thin cork; in the older pieces greyish warts occur which eventually become very numerous. The inner surface is pale grey. The transverse section is pale yellow grey, and shows under the lens a thin dark cork and numerous whitish secondary medullary rays. No odour; taste at first slight, slowly followed by a persistent acridity. Under the microscope the bark is characterised by the abundance of sclerenchymatous cells and of calcium oxalate, the latter being in prismatic or in cluster crystals. The medullary rays are one or two cells wide, and most of the cells contain a cluster crystal of calcium oxalate. In section the sclerenchymatous cells differ but little in size or shape from the parenchymatous cells; they are arranged in irregular masses throughout the secondary bast. Not unfrequently the cavity of the cell is filled with a prismatic or cluster crystal of oxalate. Associated with the sclerenchymatous cells are bast fibres, singly or in groups; they are strongly thickened and distinctly striated. In the parenchymatous cells oil globules occur, and also a few minute starch grains. A longitudinal section, stained with phloroglucin and hydrochloric acid, exhibits elongated cells filled with a yellowish, granular secretion; the inner lamella of the walls of the cells is suberised and lignified. These characters agree with those of Croton barks.

The powder accompanying the sample of bark was examined, and found to be derived from the bark.

Twenty grammes of the powdered bark were exhausted in a Soxhlet with petroleum spirit, ether, chloroform, and alcohol (97 per cent.) in succession. The petroleum spirit removed 2·54 per cent. of a fatty substance which possessed in a high degree the characteristic taste of the bark. Ether extracted a further 0·49 per cent. which had a much less acrid taste. The chloroformic extract amounted to 0·53 per cent., and was free from acridity. Alcohol removed 2·71 per cent., which was also acrid. All these extracts were tested for alkaloids, but in no case was any indication of the presence of one obtained.

To ascertain whether the acrid principle could be separated by steam distillation 10 grammes of the bark were steam distilled, the distillate shaken out with petroleum spirit, and the petroleum spirit solution evaporated to dryness; the residue was practically tasteless. The contents of the flask were then mixed with an equal volume of alcohol, boiled for a short time, filtered, and the alcohol removed by distillation under reduced pressure. The residual turbid liquid contained the acrid principle. It was shaken with petroleum spirit, ether, and chloroform in succession. Petroleum spirit removed nearly the whole of the acrid principle, ether a further small quantity, and chloroform none. It is therefore not volatile in steam.

As the acid principle was soluble in alcohol of about 50 per cent. strength, 100 grammes of the bark were exhausted by three successive macerations with alcohol of this strength. The mixed filtrates were shaken with petroleum spirit, which removed fatty matter, freed from alcohol by distillation under reduced pressure, and the resulting turbid liquid repeatedly shaken out with petroleum spirit. The petroleum spirit solution, evaporated to dryness at a low temperature, left a small quantity of a pale yellowish viscous residue. This was dissolved in 15 c.c. of alcohol, the solution diluted with an equal volume of water, and the acrid principle again extracted with petroleum spirit and finally with ether. The mixed solutions, evaporated to dryness, left 0·239 gramme of a brownish-yellow viscous oil, which rapidly darkened on heating to 100 deg. The quantity was too small to allow of further attempts at purification.

A minute quantity of this substance placed on the tongue produced the characteristic partially numbing taste of the bark, which was extremely persistent, lasting in some instances for nearly 24 hours. A tincture of the bark made with 50 per cent. alcohol had a similar taste, and also produced, when applied to the skin, a persistent redness and irritation.

The active principle of the bark appears, therefore, to be an acrid viscous oil, or soft resin.

Acrid principles of this nature are, as is well known, widely spread in the genus *Euphorbia*, of the natural order *Euphorbiaceae*, and are also found in croton oil and the milky juice of the manchineal. Most members of the genus *Croton*, however, contain, as far as is known, bitter principles (*C. Eleuteria*, *C. niveus*) or alkaloids that have not yet been sufficiently examined.

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